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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/508,913

## Applicant(s)

CHANG, ISAAC TSZ HONG

## Examiner

Jason M. Berman

## Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 9/23/2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 36-70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 36-70 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Interpretation***

1. A claim limitation will be presumed to invoke 35 U.S.C. §112 ¶ 6<sup>th</sup> only if the following three part analysis is met. 1) The claim limitation must use the phrase "means for" or "step for"; 2) the "means for" or "step for" must be modified by functional language; and 3) the phrase "means for" or "step for" must not be modified by sufficient structure, material or acts for achieving the specified function. See MPEP § 2181.

Claim 59, (iii) states 'power supply means for passing a current.' Examiner takes the position that this does not meet the three prong analysis set forth above because it is modified by sufficient structure: "power supply."

Claim 59, (iv) states 'adjustment means operably connected with at least one of the anode and cathode for controlling the spacing therebetween.' Examiner takes the position that this does not meet the three prong analysis set forth above because it is modified by sufficient structure: "connected to anode" and "controlling the spacing."

Therefore, neither limitation invokes 35 U.S.C. §112 ¶ 6<sup>th</sup>.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 64 and 70 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 70, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Regarding claim 64, A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 64 recites the broad recitation 'rode connected to one of the anode and cathode', and the claim also recites 'preferably the anode' which is the narrower statement of the range/limitation.

#### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 36, 38-39, 43-45, 49, 51, 54-55, 57-59, 63-64, 66-67 and 70 are rejected under 35 U.S.C. 102(b) as being anticipated by Savage (US 4,731,515).

As to claim 36, Savage discloses a process for the production of submicron particles comprising the steps of:

- placing first and second electrodes in a volume of coolant, the electrodes being mutually spaced (Figure 2: showing electrodes 20 and 25 placed in cryogenic fluid 50);
- passing an electrical current across the electrodes whereby to generate an electrical arc there between (Figure 2: showing power supply connected via cables 32 and 34 to electrodes; col 1 lines 38-40: electro-discharge used to produce powder);
- maintaining a stable arc by controlling the relative spacing between the two electrodes to melt or evaporate and separate material from at least one of the electrodes such that droplets of said material are formed (col 2 lines 63-66: means for maintaining a gap between electrodes during erosion of electrodes); and
- Quenching said droplets to form said submicron particles of the material in the coolant (abstract: formation of powder in cryogenic fluid; col 4 line 25: cryogenically solidified powder; col 4 line 56: powder less than 10 microns).

As to claims 38 and 39, Savage discloses the electrodes used in the method are made from metals and are titanium (col 1 line 60: titanium electrodes).

As to claim 43, Savage discloses the coolant is maintained at a temperature of less than 200 K (col 1 line 58: use of liquid argon [boiling point of argon is 85 K]).

As to claim 44, Savage discloses the coolant is liquid nitrogen or liquid argon (col 1 lines 58 and 60-61).

As to claim 45, Savage discloses a quantity of reactant is mixed with an essentially inert coolant such that the material melted/evaporated in step (iii) reacts with the reactant prior to being quenched in step (iv) (col 1 line 59-61: use of liquid nitrogen to from a compound with the metal).

As to claim 49, Savage discloses step (iii) is achieved by moving, preferably continuously, one of the electrodes relative to the other as material is melted/evaporated. (claim 6: means for maintaining the spacing as the electrodes are continuously eroded; col 3 line 15: adjustment of electrode gap [inherently involves moving at least one electrode]).

As to claim 51 Savage discloses the process is a batch process and the particles being recovered after removal of the coolant (col 1 lines 45-47).

As to claim 54, Savage discloses a process for depositing a coating on a substrate comprising the steps:

- placing first and second electrodes in a volume of coolant, the electrodes being mutually spaced (Figure 2: showing electrodes 20 and 25 placed in cryogenic fluid 50); and

- Passing an electrical current across the electrodes whereby to generate an electrical arc there between (Figure 2: showing power supply connected via cables 32 and 34 to electrodes; col 1 lines 38-40: electro-discharge used to produce powder).

It is noted that Savage does not explicitly disclose the formation of a coating on the electrodes. It is inherent that during an arc vaporization process, as disclosed by Savage, that material liberated from the closely aligned electrodes will redeposit on the electrodes thus forming a coating.

As to claim 55, Savage discloses the coolant is liquid nitrogen and the process results in a nitrogen-based coating (col 1 lines 58 and 60-61; col 1 line 59-61: use of liquid nitrogen to form a compound with the metal).

As to claim 57, Savage discloses the electrode serving as the substrate is continuously moved relative to the other electrode, whereby to form a continuous coating on the substrate electrode (col 6 lines 27-30: adjusting spacing between electrodes).

As to claim 58, Kuehnle discloses the electrode serving as the substrate is maintained stationary and is surrounded by the other electrode at a given spacing, whereby to provide a continuous coating on the substrate electrode in a single step operation (Figure 2: showing stationary electrode 25 surrounding movable electrode 20).

As to claim 59, Savage discloses an apparatus for the production of submicron particles, said apparatus comprising:

- a sealable container for coolant (col 2 lines 44-46: bath in vessel 40);
- an anode and a cathode mounted within the container (col 2 lines 44-45: electrodes 20 and 25 immersed in bath in vessel);
- power supply means for passing a current between the anode and cathode (col 2 lines 42-43: power supply 30 connected to electrodes 20 and 25); and
- Adjustment means operably connected with at least one of the anode and cathode for controlling the spacing therebetween (col 6 lines 27-30: adjusting spacing between electrodes).

As to claim 63, Savage discloses a supporting frame is provided for the anode, cathode and adjustment means, which components together with the supporting frame constitute an assembly which is removable from the container (figures 1 and 2: showing electrode 20 supported by hydraulics 14 and electrode 25 supported by collector 46, all capable of being removed from chamber 40).

As to claim 64, Savage discloses the adjustment means comprises a rod connected to one of the anode and cathode, the rod extending to the anode or cathode through a wall of the container (Figure 1: showing hydraulic rod 14 for controlling spacing by movement of electrode 20 through the wall of container 40).

As to claim 66, Savage discloses a sensing means is provided, the adjustment means and sensing means being operably connected such that in use, the adjustment means is automatically adjusted according to the output of the sensing means ( col 3 lines 13-20: voltage measurement used to control gap).

As to claim 67, Savage discloses the sensing means comprises a voltmeter for monitoring the voltage across the anode and cathode (col 3 line 9).

As to claim 70, Savage discloses the container is provided with a powder recovery region, such as a collector plate located at the base or on the wall of the container (col 2 lines 48-50: collector 46 in vessel [figure 2]).

6. Claims 36, 38, 45, 48-50, 52, 54, 57-59, 64, 66-67, and 70 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuehnle (US 5,879,518).

As to claim 36, Kuehnle discloses a process for the production of submicron particles comprising the steps of:

- placing first and second electrodes in a volume of coolant, the electrodes being mutually spaced (Figure 4: showing electrodes 66 and 34 and coolant air (114) and argon around the electrodes);
- passing an electrical current across the electrodes whereby to generate an electrical arc therebetween (abstract: arc ignited across gap by a potential difference);
- maintaining a stable arc by controlling the relative spacing between the two electrodes to melt or evaporate and separate material from at least one of the electrodes such that droplets of said material are formed (claim 16: means for regulating gap width to maintain energy flow between electrodes); and

- Quenching said droplets to form said submicron particles of the material in the coolant (col 1 line 41: nanosize particles generated; abstract: gas released cooled and condensed into droplets).

As to claim 38, Kuehnle discloses the electrodes used in the method are made from metals (col 6 lines 30-32).

As to claim 45, Kuehnle discloses a quantity of reactant is mixed with an essentially inert coolant such that the material melted/evaporated in step (iii) reacts with the reactant prior to being quenched in step (iv) (col 6 lines 10-18: addition of dopant gas to react with vapor before solidification).

As to claim 48, Kuehnle discloses that during step (iii), a flow of coolant is introduced into the spacing between the electrodes whereby to displace droplets out of the hot zone of the arc (figure 4: showing argon flowing through hollow tube electrodes, pushing vapor droplets outwards [arrows]; claim 5).

As to claim 49, Kuehnle discloses step (iii) is achieved by moving, preferably continuously, one of the electrodes relative to the other as material is melted/evaporated. (col 4 lines 20-24: advancing electrode to maintain gap distance).

As to claim 50, Kuehnle discloses during step (iii), relative rotation is induced between the electrodes whereby to promote separation of the material from the electrode (col 4 lines 25-27).

As to claim 52, Kuehnle discloses the process is continuous, the method including a step of continuously passing coolant over the electrodes (col 6 lines 20-25; claim 5).

As to claim 54, Kuehnle discloses a process for depositing a coating on a substrate comprising the steps:

- placing first and second electrodes in a volume of coolant, the electrodes being mutually spaced (Figure 4: showing electrodes 66 and 34 and coolant air (114) and argon around the electrodes);
- Passing an electrical current across the electrodes whereby to generate an electrical arc therebetween (abstract: arc ignited across gap by a potential difference).

It is noted that Kuehnle does not explicitly disclose the formation of a coating on the electrodes. It is inherent that during an arc vaporization process, as disclosed by Kuehnle, that material liberated from the closely aligned electrodes will redeposit on the electrodes thus forming a coating.

As to claim 57, Kuehnle discloses the electrode serving as the substrate is continuously moved relative to the other electrode, whereby to form a continuous coating on the substrate electrode (col 4 lines 25-27).

As to claim 58, Kuehnle discloses the electrode serving as the substrate is maintained stationary and is surrounded by the other electrode at a given spacing, whereby to provide a continuous coating on the substrate electrode in a single step operation (Figure 4: showing both electrodes surrounded by collar 22 as to be fully exposed to each other).

As to claim 59, Kuehnle discloses an apparatus for the production of submicron particles, said apparatus comprising:

- a sealable container for coolant (figure 1: showing chamber 10);
- an anode and a cathode mounted within the container (figure 1: showing electrodes 66 and 34);
- power supply means for passing a current between the anode and cathode (figure 1: showing power source 104); and
- Adjustment means operably connected with at least one of the anode and cathode for controlling the spacing therebetween (figure 1: showing gears 78 and 39 and screws 72 and 38 for adjusting gap 'G').

As to claim 63, Kuehnle discloses a supporting frame is provided for the anode, cathode and adjustment means, which components together with the supporting frame constitute an assembly which is removable from the container (Figure 2: showing collar 42 for electrode 34 connecting adjustment gear and thread 39 and 38 [mirror system for other electrode not shown] all capable of being removed from chamber 12).

As to claim 64, Kuehnle discloses the adjustment means comprises a rod connected to one of the anode and cathode, the rod extending to the anode or cathode through a wall of the container (Figure 1 - showing gears to adjust location of anode and cathode 34 and 66 by tube located outside walls of container 10).

As to claim 66 and 67, Kuehnle discloses a control for regulating the voltage across the electrodes (claim 16).

As to claim 70, Kuehnle discloses the container is provided with a powder recovery region (Figure 1: showing recovery traps labeled 13).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Savage, as applied to claim 36 under 35 U.S.C. 102(b) above, and further in view of Harris (US 3,997,748).

As to claim 37, Savage is silent as to the electrodes being initially in contact when the electrical current is passed through them, the arc being created by moving them apart.

Harris discloses a method of arc discharge (abstract) Harris also discloses the electrodes initially being in contact with one another when electrical current is passed through them, creating an arc by moving the electrodes apart (col 2 lines 31-37).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to induce an arc by contact and separation of electrodes, as

disclosed by Harris, in the method of forming particles of Savage, because contact and separation is an effective method of initiating an arc.

10. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle, as applied to claim 36 under 35 U.S.C. 102(b) above, and further in view of Harris (US 3,997,748).

As to claim 37, Kuehnle is silent as to the electrodes being initially in contact when the electrical current is passed through them, the arc being created by moving them apart.

Harris discloses a method of arc discharge (abstract) Harris also discloses the electrodes initially being in contact with one another when electrical current is passed through them, creating an arc by moving the electrodes apart (col 2 lines 31-37).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to induce an arc by contact and separation of electrodes, as disclosed by Harris, in the method of forming particles of Kuehnle, because contact and separation is an effective method of initiating an arc.

11. Claims 53 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle as applied under 35 U.S.C. 102(b) to claims 52 and 59 above, and further in view of Zurecki (US 5,294,242).

As to claims 53 and 69, Kuehnle is silent as to the recycling of the coolant through an inlet and outlet for coolant with powder recovery being downstream of the container.

Zurecki discloses a method of forming a powder by an electric arc between two electrodes, and subsequently quenching the powder in a cryogenic coolant (abstract, figure 1). Zurecki also discloses of a recycling method and apparatus with an outlet and inlet for the coolant and a coolant return circuit being provided between the outlet and inlet and a powder recovery region being downstream of the container (Figure 1: showing coolant and particles exiting container 100 by outlet 111 into recovery container 200 where coolant returns via inlet 219 to container 100).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a method and apparatus for coolant recycling, as disclosed by Zurecki, in the method and apparatus of forming a powder of Kuehnle, because recycling coolant reduces costs associated with a continuous process.

12. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Savage.

As to claim 56, Savage does not explicitly disclose a coating at least 1  $\mu\text{m}$  thick.

Savage discloses the claimed invention except for the coating thickness. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to create a coating of at least 1  $\mu\text{m}$  since it has been held "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). MPEP 2144.05 II.

13. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle.

As to claim 56, Kuehnle does not explicitly disclose a coating at least 1  $\mu\text{m}$  thick.

Kuehnle discloses the claimed invention except for the coating thickness. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to create a coating of at least 1  $\mu\text{m}$  since it has been held "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). MPEP 2144.05 II.

14. Claims 40-42 and 61-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Savage, as applied to claims 36 and 59 above under 35 U.S.C. 102(b), and further in view of the English Translation of Yanagiya (English Translation JP 07070615A).

As to claim 40, Savage is silent as to the use of bilayer or multilayer electrodes.

Yanagiya discloses a composite electrode for the production of powder (English translation abstract). Yanagiya also discloses the formation of multilayer electrodes (figures 1 and 2). The multilayer design allows for the formation of a powder of desired elemental ratio (abstract) and allows formation of the electrode from weak materials (English translation detailed description: paragraph 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a multilayer electrode, as disclosed by Yanagiya, in the method of forming a powder of Savage, because a multilayer electrode allows for formation of multi-component powders from structurally weak elements.

As to claims 41 and 42, Yanagiya discloses an electrode with an inner core of Fe and an outer layer of Cu (English translation paragraph 12: pure Fe inside with NdFeBCu outer layer).

As to claim 61, Savage is silent as to the electrodes comprising more than one material which react before solidification.

Yanagiya also discloses the formation of multilayer electrodes which result in multi-component powders (figures 1 and 2; English translation paragraph 9: formation of TbFe<sub>2</sub> powder from Fe and Tb layered electrode). The multilayer design allows for the formation of a powder of desired elemental ratio (abstract) and allows formation of the electrode from weak materials (English translation detailed description: paragraph 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a multilayer electrode, as disclosed by Yanagiya, in the method of forming a powder of Savage, because a multilayer electrode allows for formation of multi-component powders from structurally weak elements.

As to claim 62, Yanagiya discloses the anode and/or cathode may comprise bi-layer or multilayer structures of different materials, such that the layer structures are maintained in the submicron particles formed at the end of the process (English translation abstract).

15. Claims 40-42 and 61-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle, as applied to claims 36 and 59 above under 35 U.S.C. 102(b), and further in view of the English Translation of Yanagiya (English Translation JP 07070615A).

As to claim 40, Kuehnle is silent as to the use of bilayer or multilayer electrodes.

Yanagiya discloses a composite electrode for the production of powder (English translation abstract). Yanagiya also discloses the formation of multilayer electrodes (figures 1 and 2). The multilayer design allows for the formation of a powder of desired elemental ratio (abstract) and allows formation of the electrode from weak materials (English translation detailed description: paragraph 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a multilayer electrode, as disclosed by Yanagiya, in the method of forming a powder of Kuehnle, because a multilayer electrode allows for formation of multi-component powders from structurally weak elements.

As to claims 41 and 42, Yanagiya discloses an electrode with an inner core of Fe and an outer layer of Cu (English translation paragraph 12: pure Fe inside with NdFeBCu outer layer).

As to claim 61, Kuehnle is silent as to the electrodes comprising more than one material which react before solidification.

Yanagiya also discloses the formation of multilayer electrodes which result in multi-component powders (figures 1 and 2; English translation paragraph 9: formation of TbFe<sub>2</sub> powder from Fe and Tb layered electrode). The multilayer design allows for the formation of a powder of desired elemental ratio (abstract) and allows formation of the electrode from weak materials (English translation detailed description: paragraph 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a multilayer electrode, as disclosed by Yanagiya, in the

method of forming a powder of Kuehnle, because a multilayer electrode allows for formation of multi-component powders from structurally weak elements.

As to claim 62, Yanagiya discloses the anode and/or cathode may comprise bi-layer or multilayer structures of different materials, such that the layer structures are maintained in the submicron particles formed at the end of the process (English translation abstract).

16. Claims 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Savage, as applied to claim 36 under 35 U.S.C. 102(b) above, and further in view of Kemp (US 4,763,423).

As to claims 46 and 47, Savage is silent as to the addition of solvent and surfactant to the coolant.

Kemp discloses a method for removing a fine metal powder from a liquid (abstract). Kemp also discloses the addition of solvent and surfactant to the liquid to aid in the separation process (col 1 lines 42-46). The addition of solvent and surfactant is disclosed as effective for drying powder which are difficult to dry because of their large surface areas.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to introduce solvent and surfactant into the liquid, as disclosed by Kemp, in the method of producing a powder of Savage, because solvents and surfactants help the difficult separation of the fine powder from the liquid.

17. Claims 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle, as applied to claim 36 under 35 U.S.C. 102(b) above, and further in view of Kemp (US 4,763,423).

As to claims 46 and 47, Kuehnle is silent as to the addition of solvent and surfactant to the coolant.

Kemp discloses a method for removing a fine metal powder from a liquid (abstract). Kemp also discloses the addition of solvent and surfactant to the liquid to aid in the separation process (col 1 lines 42-46). The addition of solvent and surfactant is disclosed as effective for drying powder which are difficult to dry because of their large surface areas.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to introduce solvent and surfactant into the liquid, as disclosed by Kemp, in the method of producing a powder of Kuehnle, because solvents and surfactants help the difficult separation of the fine powder from the liquid.

18. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Savage, as applied to claim 59 under 35 U.S.C. 102(b) above, and further in view of Boxman (US 4,645,895).

Savage is silent as to the anode/cathode combination being tungsten-steel or graphite-steel.

Boxman discloses a method of coating a workpiece by arc discharge between an anode and cathode (abstract). Boxman also discloses the use of a tungsten-steel or

graphite-steel anode/cathode combination (col 10 lines 57-59: tungsten and steel; col 13 lines 30-33: graphite and steel).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the anode/cathode combinations of Boxman with the apparatus of Savage, because tungsten and graphite have desirable resistance properties (Boxman at col 13 line 63).

19. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle, as applied to claim 59 under 35 U.S.C. 102(b) above, and further in view of Boxman.

Kuehnle is silent as to the anode/cathode combination being tungsten-steel or graphite-steel.

Boxman discloses a method of coating a workpiece by arc discharge between an anode and cathode (abstract). Boxman also discloses the use of a tungsten-steel or graphite-steel anode/cathode combination (col 10 lines 57-59: tungsten and steel; col 13 lines 30-33: graphite and steel).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the anode/cathode combinations of Boxman with the apparatus of Savage or Kuehnle, because tungsten and graphite have desirable resistance properties (Boxman at col 13 line 63).

20. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle.

As to claim 65, Kuehnle discloses the rod is screw-threadingly engaged (Figure 1: showing screw threads 38).

It is noted that Kuehnle discloses the claimed invention except for the screw threads engaged in the wall of the container. Kuehnle is silent as to the exact location of the threading and it would have been obvious to one having ordinary skill in the art at the time of the invention was made to locate the threads at the wall since it has been held that mere rearranging of parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70. MPEP 2144 VI (C).

21. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Savage, as applied to claim 67 under 35 U.S.C. 102(b) above, and further in view of Aoyama (US 4,657,384).

As to claim 68, Savage is silent as to the use of a spectrometer to measure the temperature by monitoring the intensity or wavelength of light produced by the arc.

Aoyama discloses a method of quickly and accurately measuring temperature (abstract). Aoyama also discloses the use a spectrometer to indirectly measure temperature by monitoring the intensity of light produced by a target (col 2 lines 17-23).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine a temperature by monitoring the intensity of light produced, as disclosed by Aoyama, in the method of Savage, because excessive temperatures are detrimental to arc vaporization apparatuses and the temperature of an arc cannot easily be directly measured.

22. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehnle, as applied to claim 67 under 35 U.S.C. 102(b) above, and further in view of Aoyama (US 4,657,384).

As to claim 68, Kuehnle is silent as to the use of a spectrometer to measure the temperature by monitoring the intensity or wavelength of light produced by the arc.

Aoyama discloses a method of quickly and accurately measuring temperature (abstract). Aoyama also discloses the use a spectrometer to indirectly measure temperature by monitoring the intensity of light produced by a target (col 2 lines 17-23).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to determine a temperature by monitoring the intensity of light produced, as disclosed by Aoyama, in the method of Kuehnle, because excessive temperatures are detrimental to arc vaporization apparatuses and the temperature of an arc cannot easily be directly measured.

#### ***Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Berman whose telephone number is (571)270-5265. The examiner can normally be reached on M-R 8am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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September 2, 2008